

写真3-1 No. 2エンジン

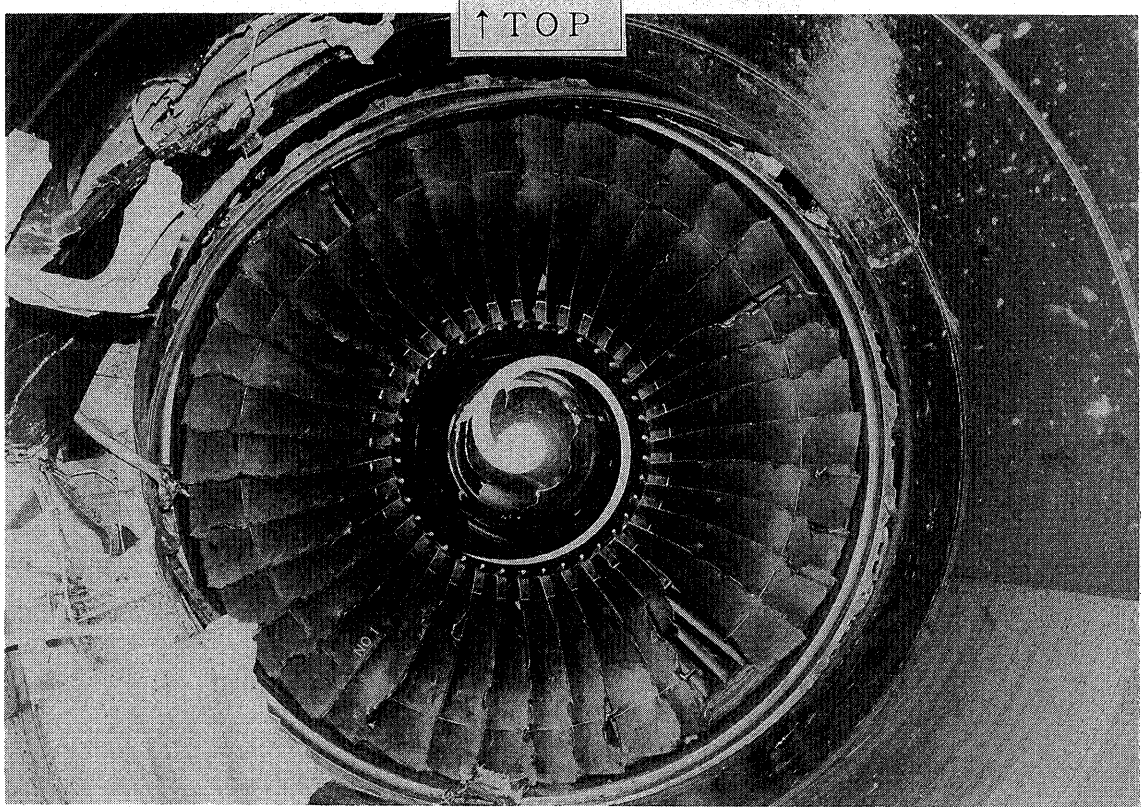


写真3-2 No. 2エンジン (エア・インレット・ダクト破孔部)



写真4-1 No. 3エンジン

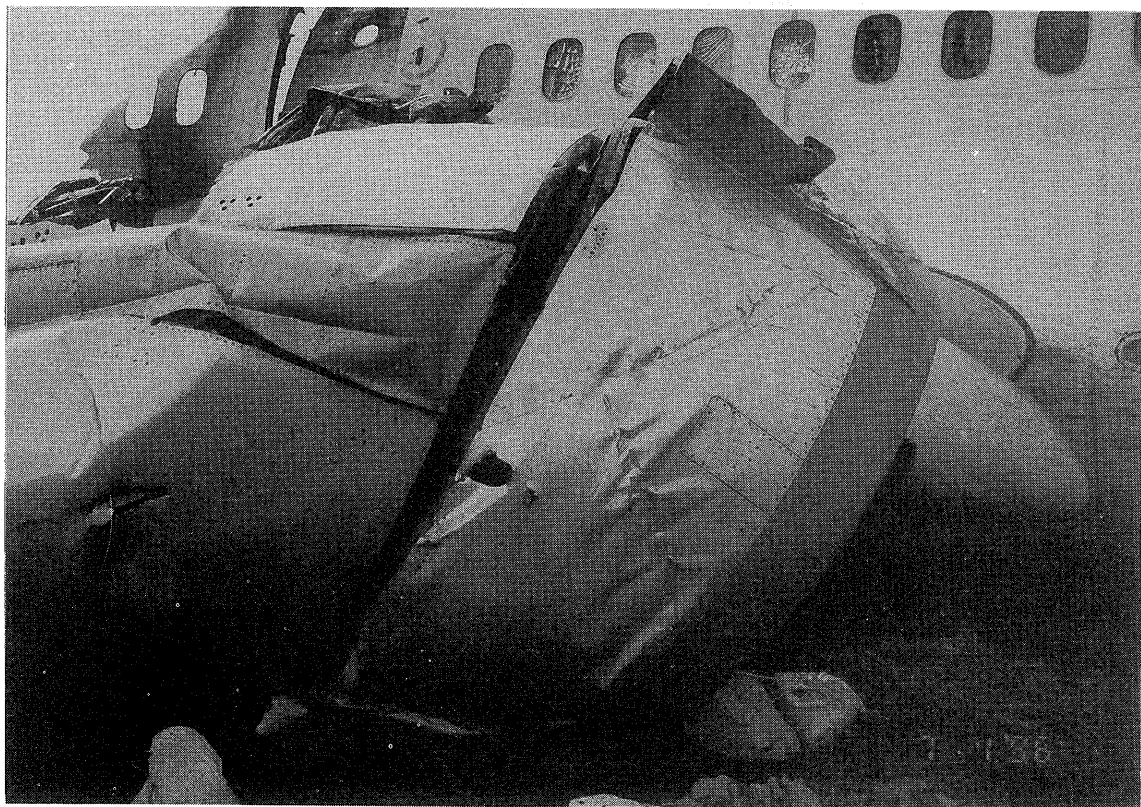


写真4-2 No. 3エンジン

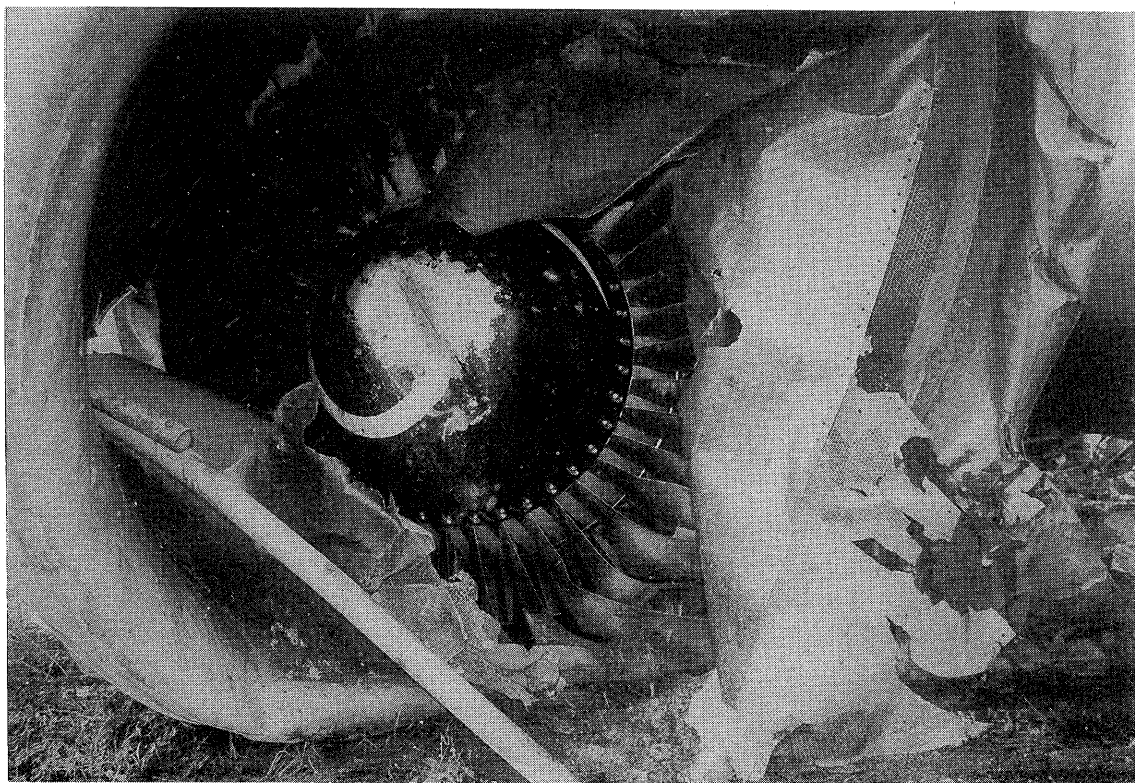


写真4-3 No. 3エンジン (分解調査前)

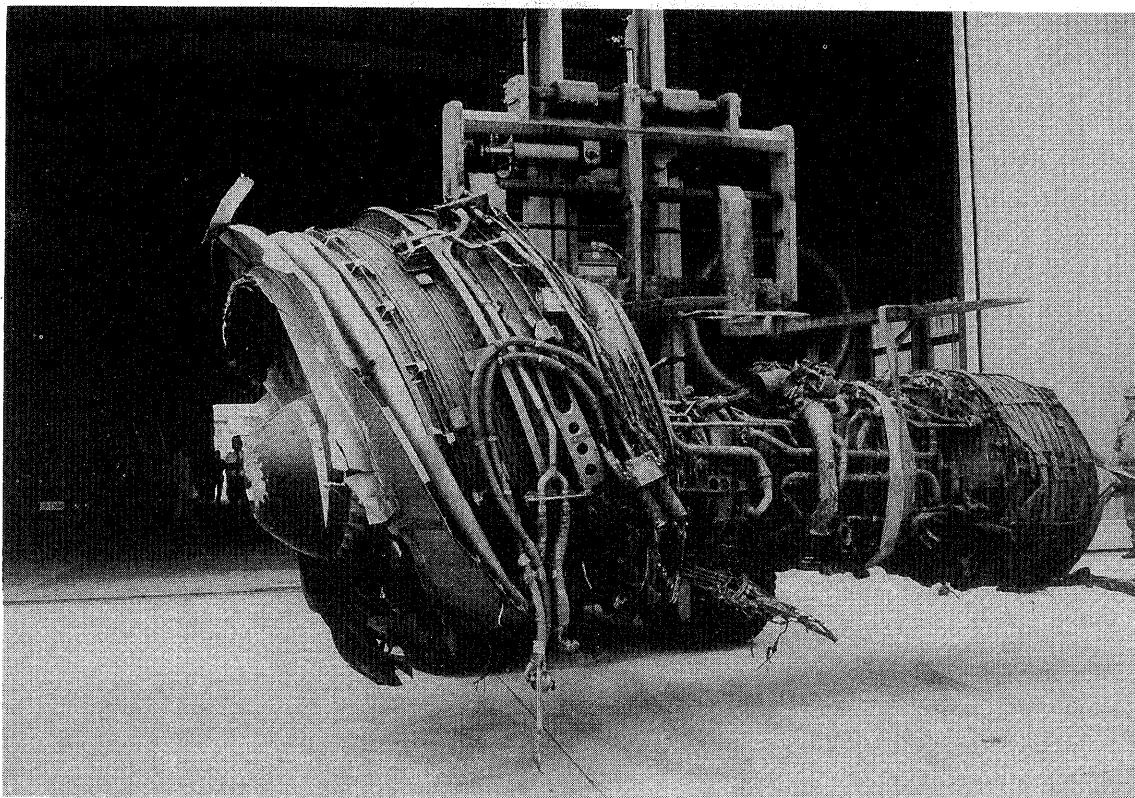


写真4-4 No. 3エンジン (分解調査前)

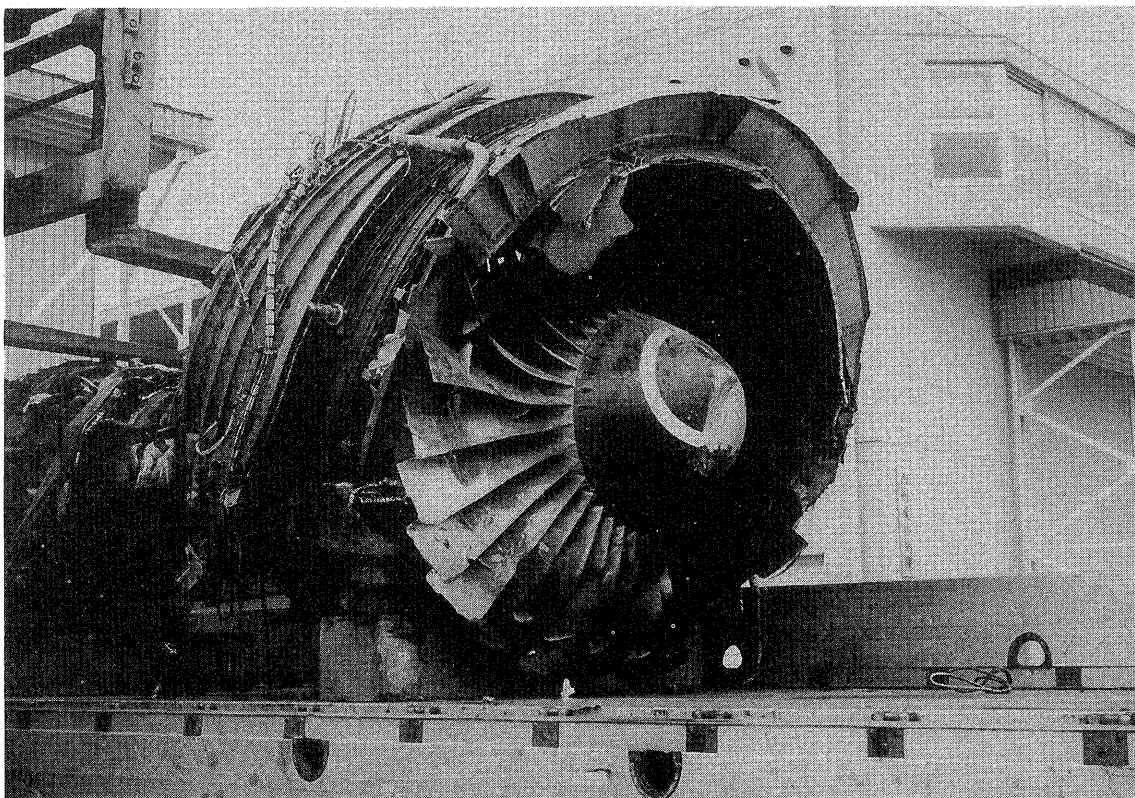


写真4-5 No. 3エンジン (HPTの破損状況、ディスクに付いた状態)

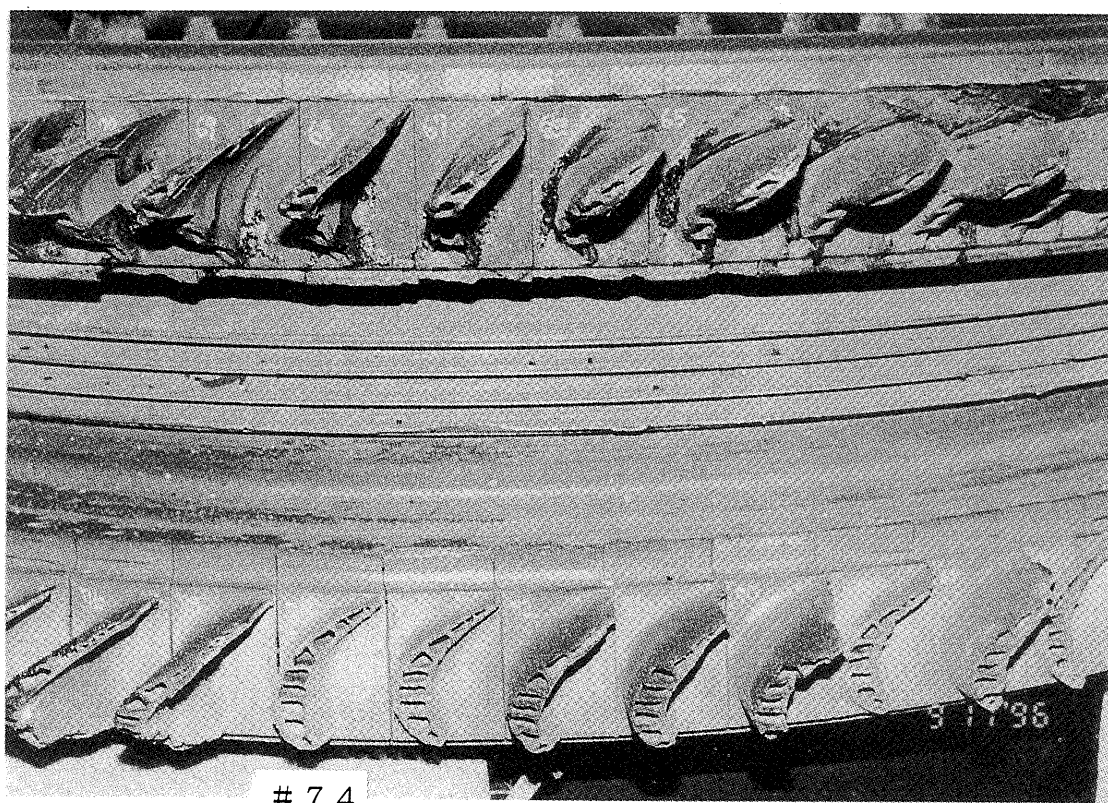


写真4-6 No. 3エンジン (第1段第74番ブレードの損傷状況)

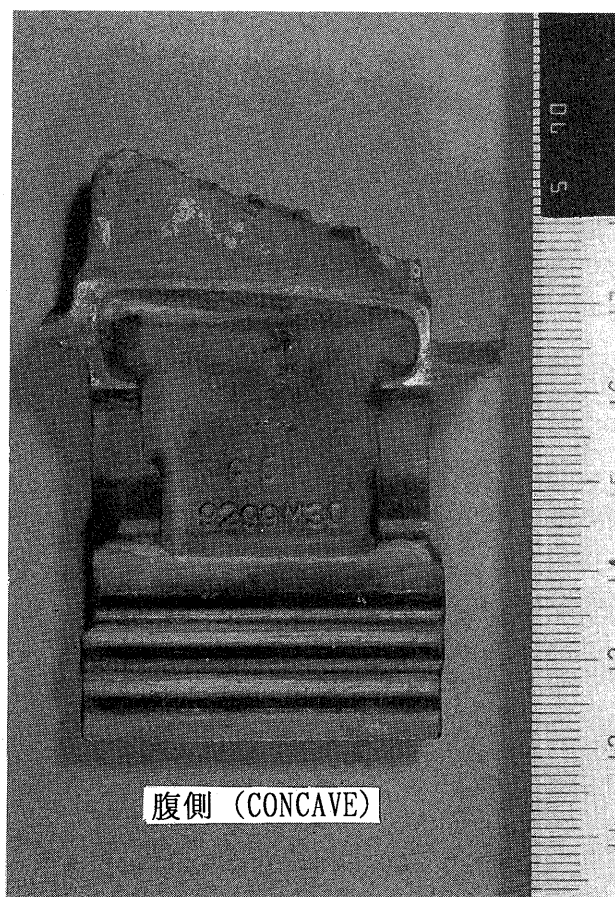
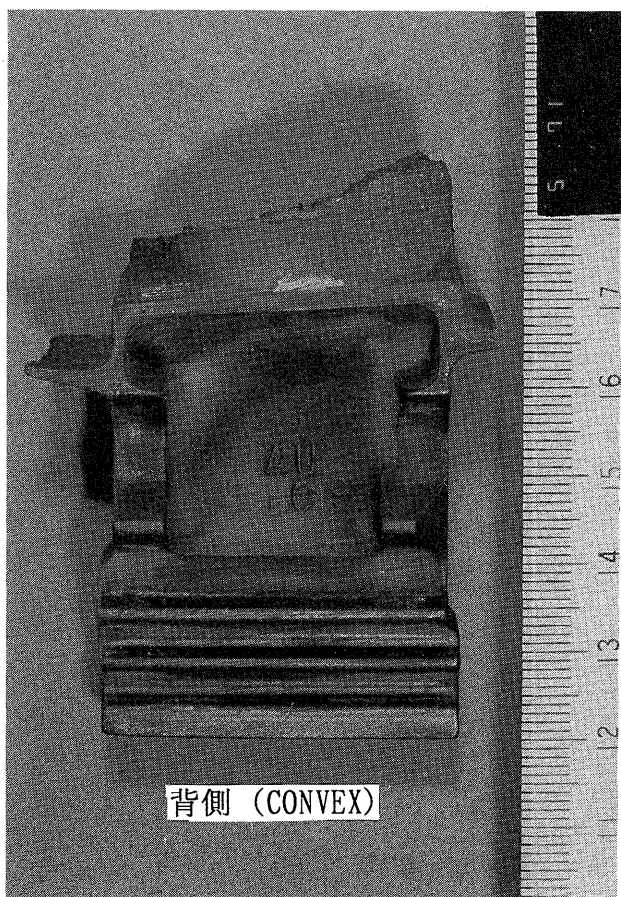


写真4-7 No. 3エンジン (第1段第74番ブレードの破断面)



別添一覧

- 別添 1 CVR記録

- 別添 2 DFDR記録
- 別添 2-1 機首方位、コンピューテッド・エアースピード、
No. 1、2、3エンジンN₁、電波高度、ピッチ角、エレベータ角
- 別添 2-2 機首方位、コンピューテッド・エアースピード、ラダー角、ロール角
エルロン角
- 別添 2-3 垂直加速度、縦方向加速度、横方向加速度
- 別添 2-4 ブレーキペダル
- 別添 2-5 オートパイロット
- 別添 2-6 エンジンスラスト・リバーサ、スポイラ
- 別添 2-7 離陸中断時の詳細

- 別添 3-1 BASIC OPERATION MANUAL (BOM) 抜粋
- 別添 3-2 AIRCRAFT OPERATION MANUAL
(AOM) 抜粋
- 別添 3-3 FLIGHT CREW REFERENCE GUIDE
(FCRG) 抜粋
- 別添 3-4 AIRPLANE FLIGHT MANUAL 抜粋
- 別添 3-5 FLIGHT ATTENDANT MANUAL 抜粋

- 別添 4-1 ALL OPERATORS WIRE (AOW)
- 別添 4-2 リージョナル・ミーティング資料抜粋

C V R 記 録

CAP : 機長
 FO : 副操縦士
 FE : 航空機関士
 TWR : 福岡タワー

日本時間	発声者	CVRの記録内容
12:06:53ごろ	TWR	: indonesia 865 wind 280 at 7. cleared for takeoff runway 16.
12:06:58 "	FO	: cleared for takeoff indonesia 865.
12:07:01 "	CAP	: set autothrottles on.
12:07:03 "	FO	: on set.
12:07:10 "	CAP	: check thrust.
12:07:18 "	FE	: rata, rata. (注1)
12:07:26 "	FO	: one hundred.
12:07:29 "	FE	: dua aja. (注2)
12:07:38 "	FO	: V one.
12:07:40 "	FO	: rotate.
12:07:42 "		・ 43秒ごろにかけて、エンジンの故障により発生したと推定される音
12:07:45 "	FE	: engine failure number one. ・ スロットル・レバーがストッパーに当たったと推定される音
12:07:46 "		・ このころから、接地後の機体の振動音が続く
12:07:48 "		・ スラスト・リバーサー作動と推定される音
12:07:54 "	CAP	: wuala stop. (注3) ・ このころから、連続的な、激しい機体の振動音、激しく機体に物がぶつかる音が続く
12:07:56 "		録音停止

(注1) インドネシア語。「揃っている」というような意味。

(注2) インドネシア語。「2だけ」というような意味。

(注3) 「ウアー 止まれ」というような意味。「wuala」はインドネシア語。

(注4) 事故原因の解析に関係のない管制交信等は記載していない。

D F D R 記録

同機に搭載されていたDFDRには、合計53種類のパラメータのデータが記録されていた。

そのうち、以下の主要なパラメータについて、離陸許可を受けたころから有効な記録が終了するまでのデータをグラフ化して示す。(一部CVR記録を付記)

(1) ENG NO.1 N ₁ (%)	:	No.1エンジンN ₁ (%)
(2) ENG NO.2 N ₁ (%)	:	No.2エンジンN ₁ (%)
(3) ENG NO.3 N ₁ (%)	:	No.3エンジンN ₁ (%)
(4) CAS(kt)	:	コンピュータ・エアスピード(kt)
(5) HDG(deg)	:	機首方位(°)
(6) R-ALT (FINE 1)(ft)	:	電波高度(ft)
(7) PITCH ANGLE(deg)	:	ピッチ角(°)
(8) ELEVATOR POSITION LH/IB(deg)	:	エレベータ角(°)
(9) RUDDER ANGLE LOWER(deg)	:	ラダー角(°)
(10) AILERON POSITION LH /IB(deg)	:	エルロン角(°)
(11) ROLL ANGLE(deg)	:	ロール角(°)
(12) VERTICAL ACCELERATION(G)	:	垂直加速度(G)
(13) LONGITUDINAL ACCELERATION(G)	:	縦方向加速度(G)
(14) LATERAL ACCELERATION(G)	:	横方向加速度(G)
(15) SPOILER (LEFT 5)(deg)	:	スポイラ(°)
(16) BRAKE PEDAL RIGHT(deg)	:	右ブレーキ・ペダル角(°)
(17) BRAKE PEDAL LEFT(deg)	:	左ブレーキ・ペダル角(°)
(18) AUTO PILOT No.1	:	No.1オート・パイロット
(19) AUTO PILOT No.2	:	No.2オート・パイロット
(20) ENG NO.1 THRUST REVERSER	:	NO.1エンジン スラスト・リバーサ
(21) ENG NO.2 THRUST REVERSER	:	NO.2エンジン スラスト・リバーサ
(22) ENG NO.3 THRUST REVERSER	:	NO.3エンジン スラスト・リバーサ

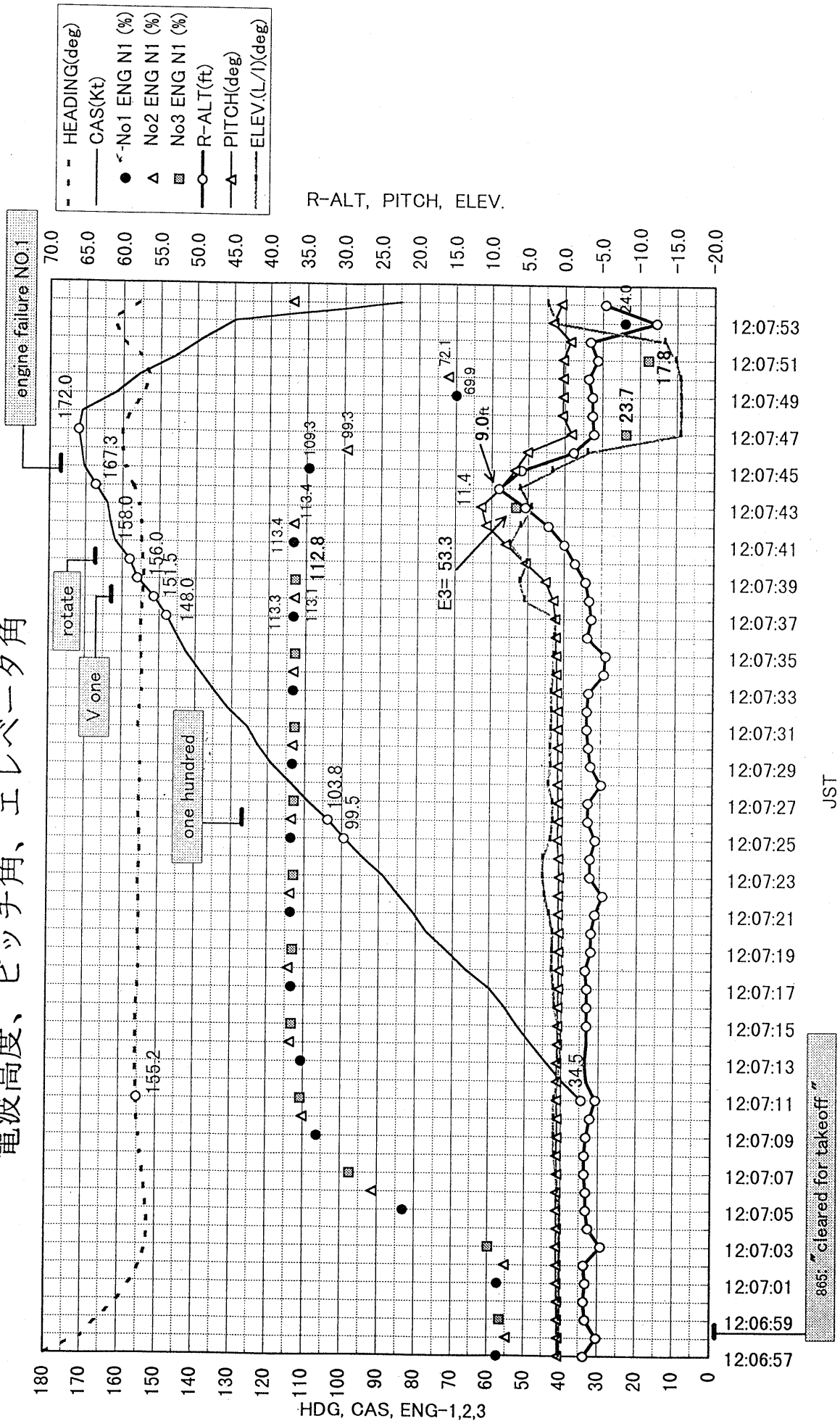
なお、同機のDFDRには、上記のほか、次の31種類のパラメータが記録されていた。

(1) PRESSURE ALTITUDE

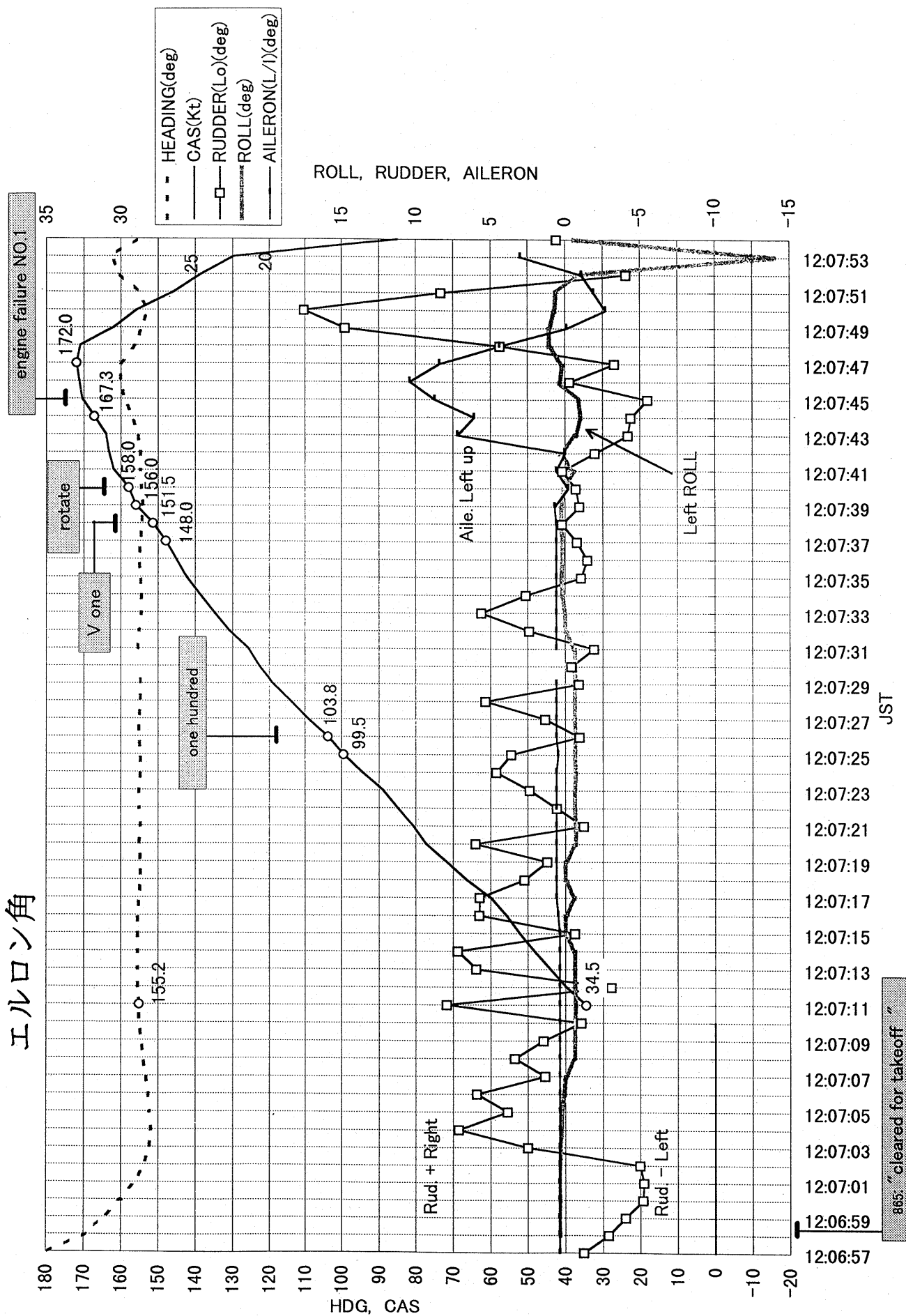
(2) MACH NUMBER

- | | |
|-------------------------------------|------------------------------------|
| (3) MAXIMUM OPERATING LIMIT SPEED | (4) TOTAL AIR TEMPERATURE |
| (5) HORIZONTAL STABILIZER | (6) RUDDER ANGLE UPPER |
| (7) R-ALT (COARSE 1) | (8) R-ALT (COARSE) 2 |
| (9) R-ALT (FINE 2) | (10) AILERON POSITION RH/OB |
| (11) SPOILER (RIGHT 3) | (12) ELEVATOR POSITION RH/OB |
| (13) PITCH ANGLE SUPPLEMENT | (14) ROLL ANGLE SUPPLEMENT |
| (15) FLAP RIGHT INBOARD | (16) BRAKE PRESSURE LEFT |
| (17) BRAKE PRESSURE RIGHT | (18) LOCALIZER DEVIATION 1 |
| (19) LOCALIZER DEVIATION 2 | (20) GLIDE SLOPE DEVIATION 1 |
| (21) GLIDE SLOPE DEVIATION 2 | (22) SPEED BRAKE HANDLE |
| (23) VHF COMMUNICATION KEYING -3 | (24) WHEEL BRAKE APPLY |
| (25) SLAT NO. 4 LEFT OUTBOARD | (26) SLAT NO. 4 RIGHT OUTBOARD |
| (27) SLAT NO. 2 LEFT INBOARD | (28) HF COMMUNICATION KEYING -1 |
| (29) HF COMMUNICATION KEYING -2 | (30) FLIGHT MODE ANNUNCIATOR, ROLL |
| (31) FLIGHT MODE ANNUNCIATOR, PITCH | |

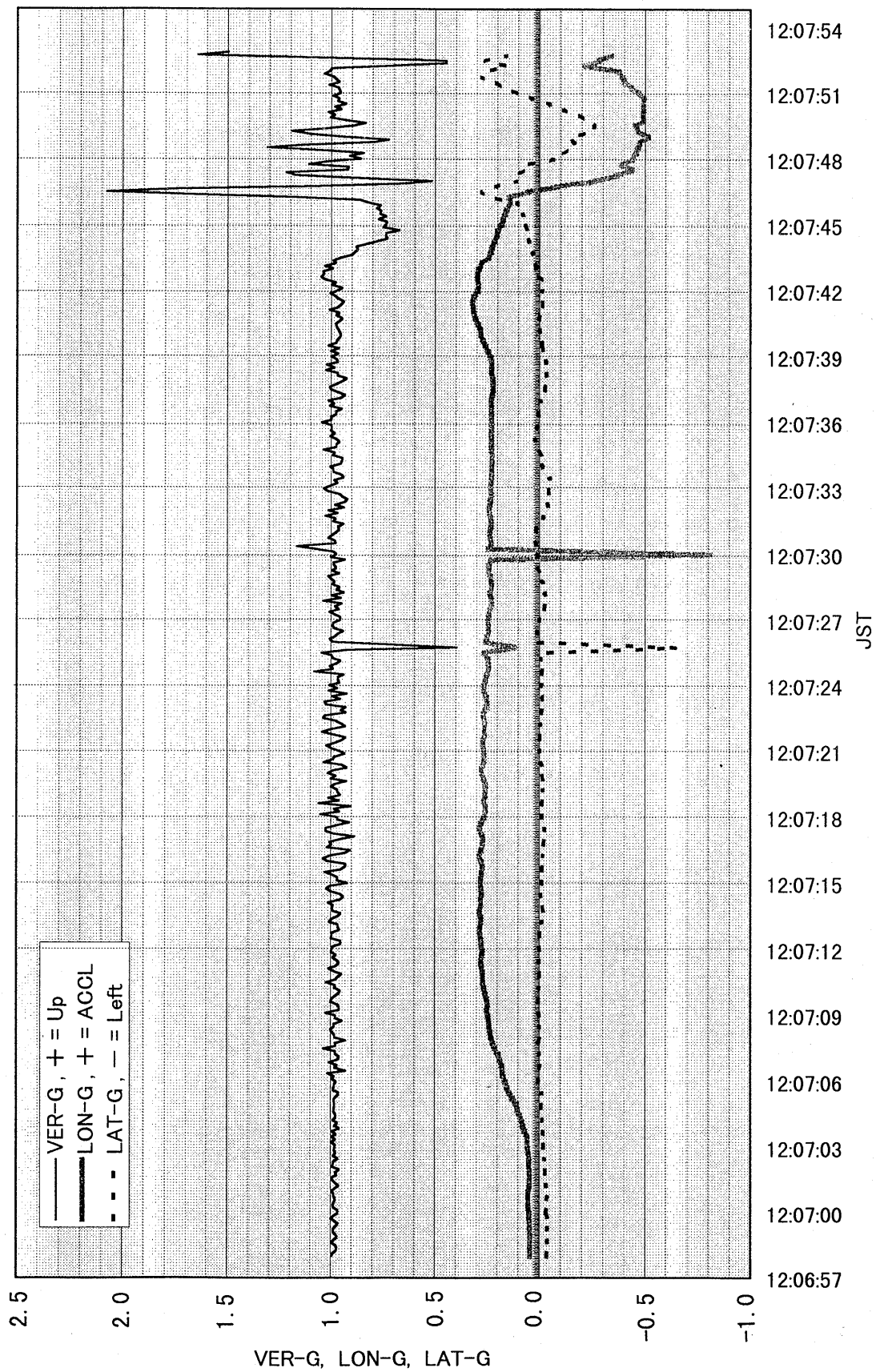
機首方位、コピュテット・エアスピード、No.1, 2, 3エンジンN1、
電波高度、ピッチ角、エレベータ角



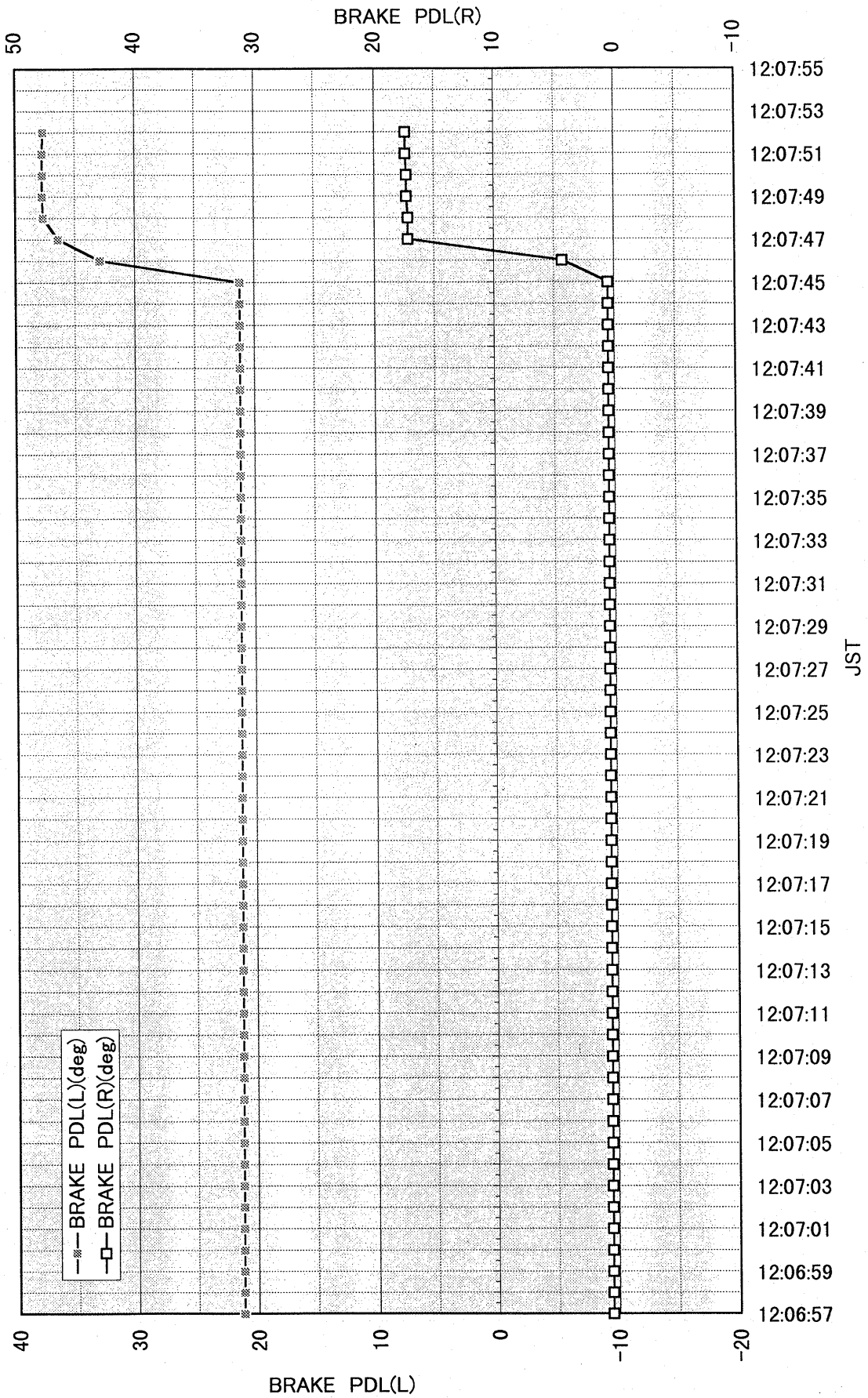
機首方位、コンピュータ・エラーモード、ラダー角、ロール角、エルロン角、別添2-2



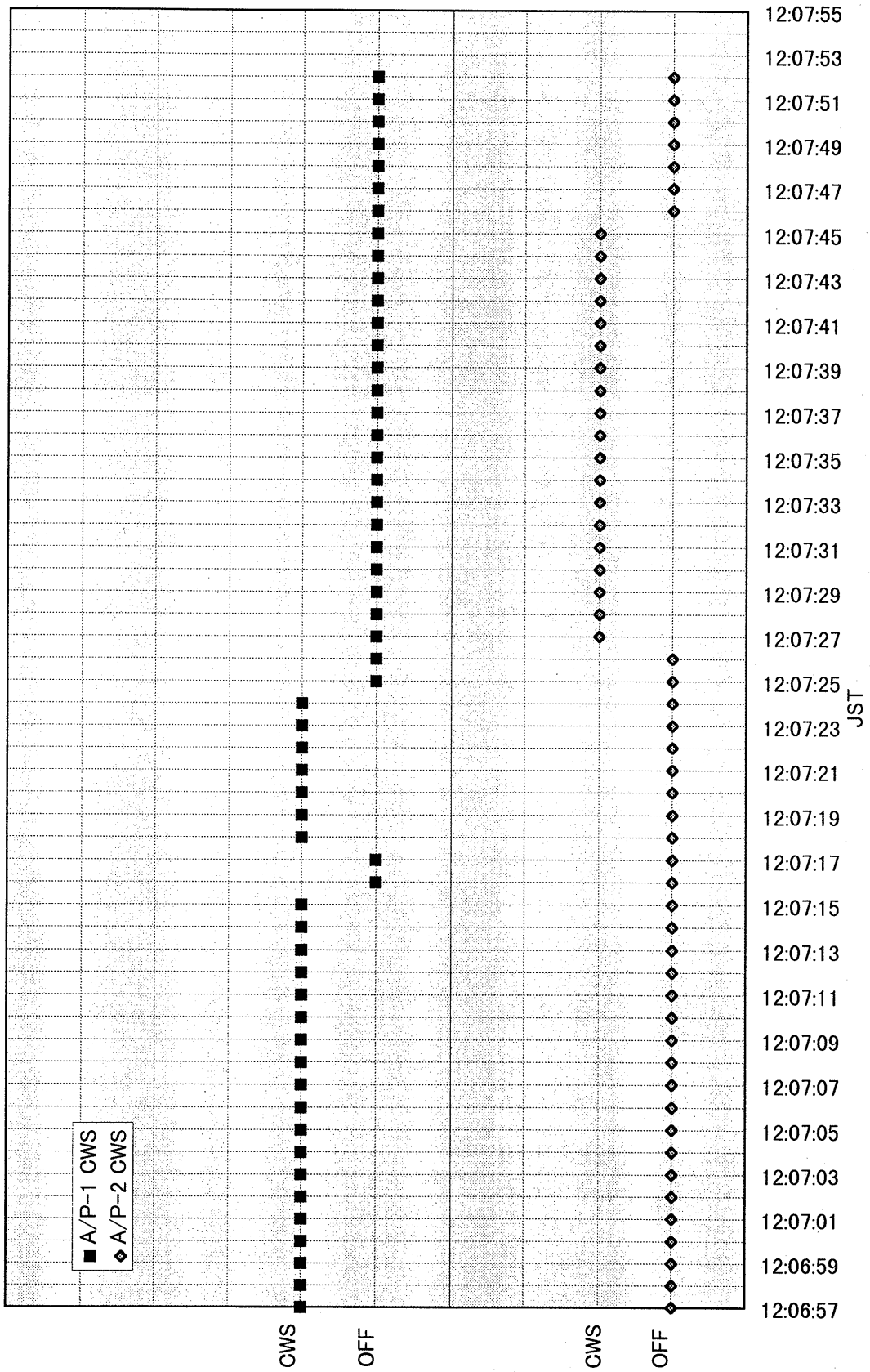
垂直加速度、縦方向加速度、横方向加速度



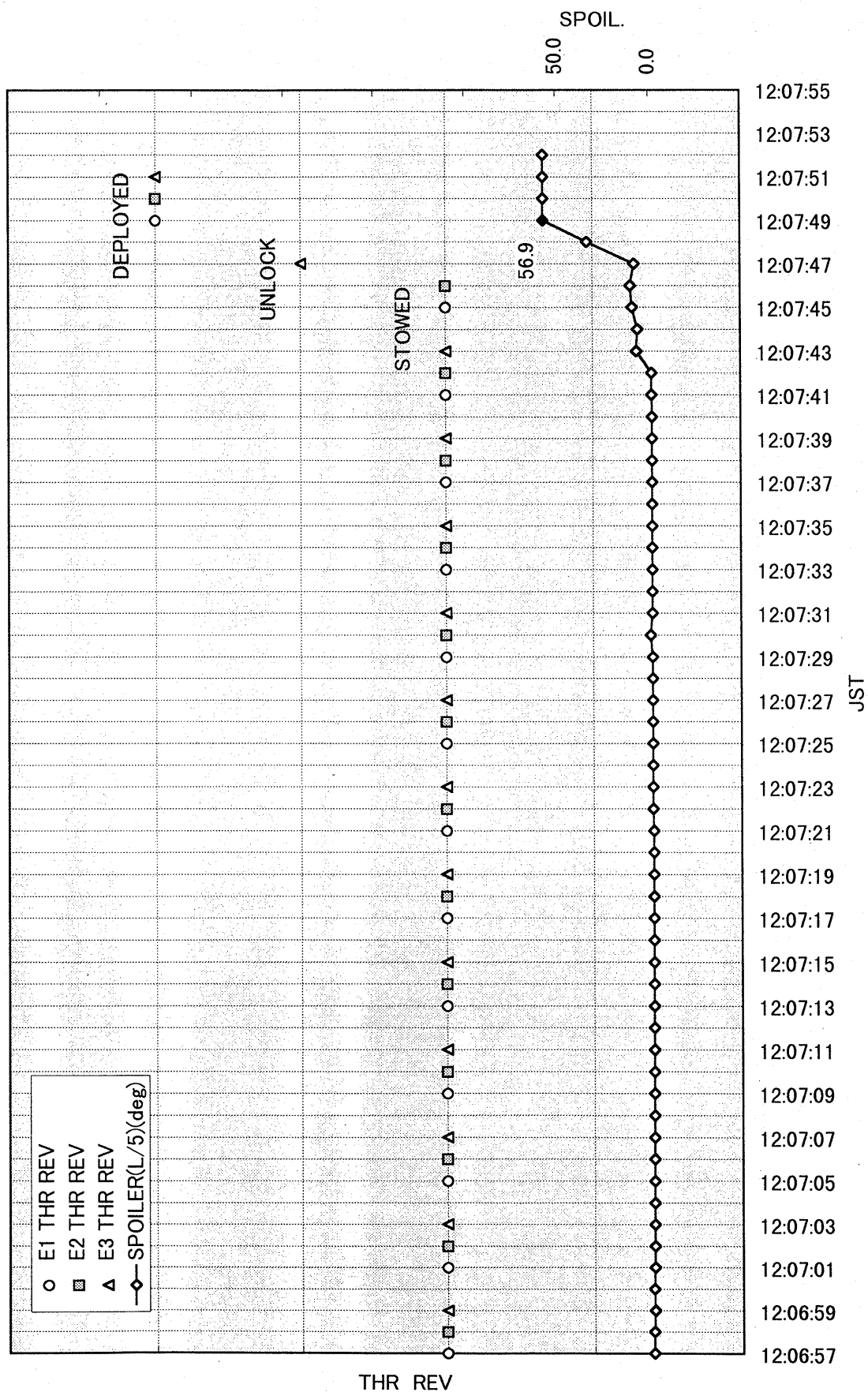
ブレーキペダル

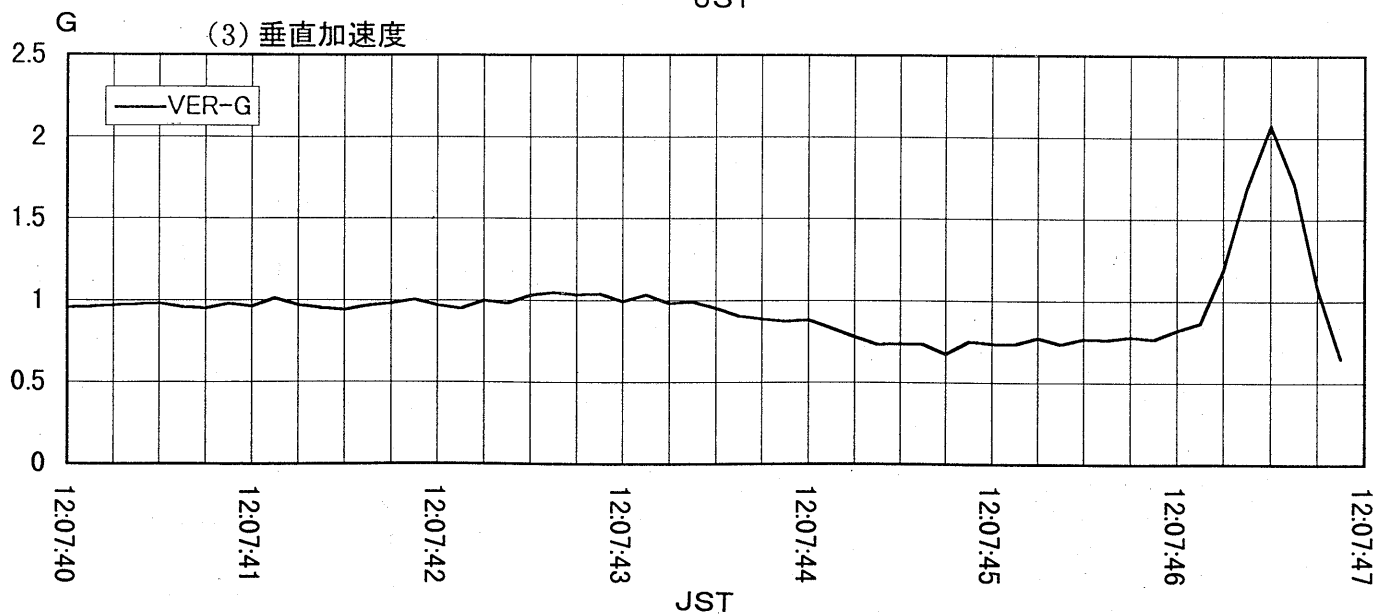
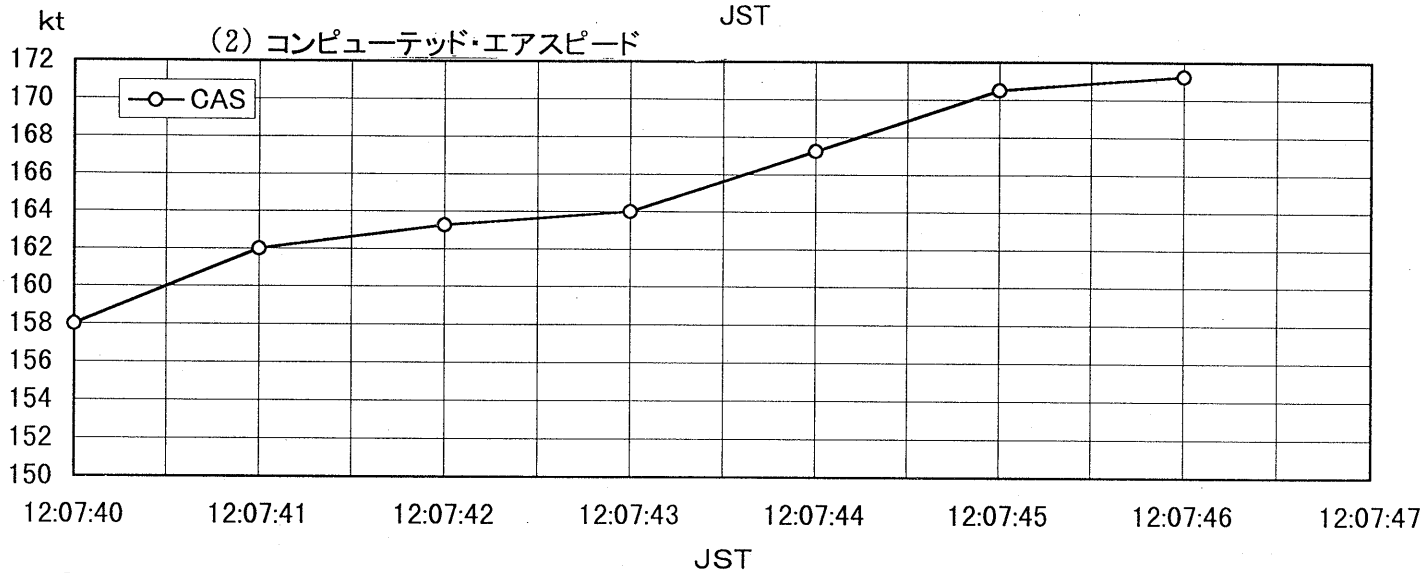
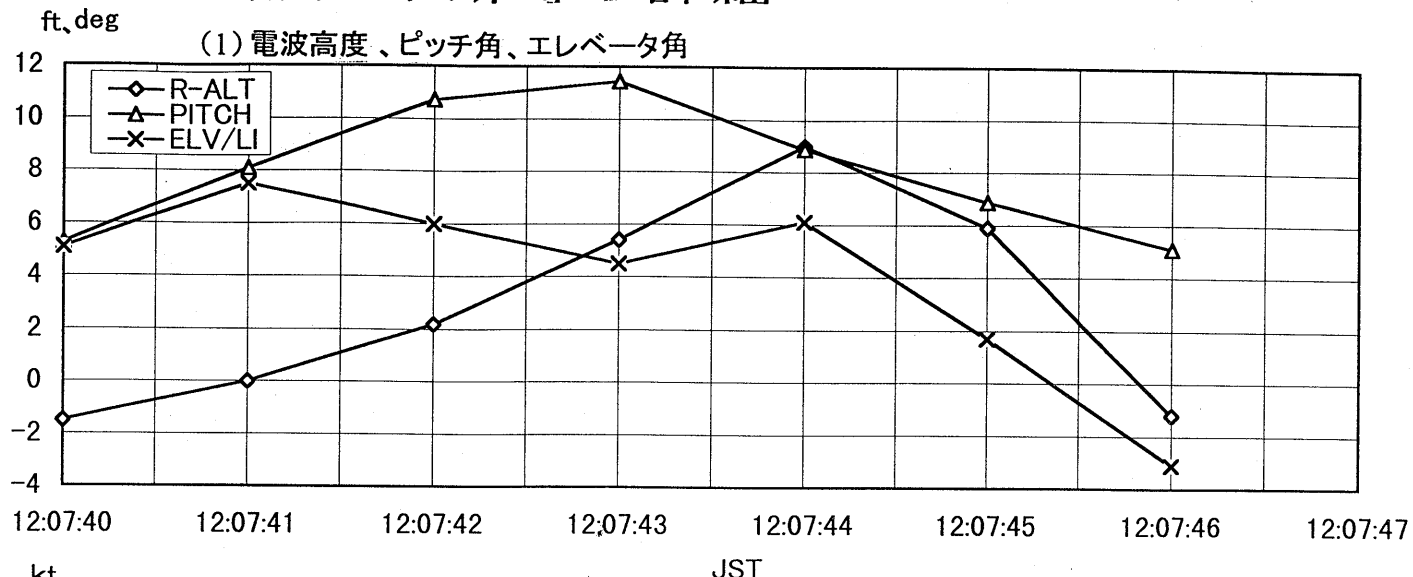


オートパイロット



エンジンスラスト・リバーサ、スポイラ





(注) 本ページのグラフは、前掲のグラフの一部について、スケールを変更する等、分かりやすくしたものである。

BASIC OPERATION MANUAL (BOM) 抜粋**4.2.2. CREW DUTIES BEFORE, DURING AND AFTER TAKE-OFF****01. GENERAL**

During taxi and during the climb phase of a flight at altitudes below approximately 5000 ft above terrain, all cockpit crew members shall concentrate on cockpit procedures, cockpit monitoring and look out, and refrain from non-essential matters.

03. DURING TAKE-OFF

Talking should be limited to the required commands and calls as specified in the AOM.

In case of malfunctioning which may affect the take-off, the PiC will decide upon the action to be taken and given the appropriate command when required.

The flight engineer, if on board, is not allowed to stop an engine during take-off without the expressed command to that the effect, except for certain conditions as indicated in the relevant AOM.

To ensure good verbal communication between cockpit crew members, those wearing headphones will keep one ear free during take-off.

04. REJECTION OF TAKE-OFF

The minimum required accelerate-stop distance is based on a smooth, hard and dry runway.

For each aircraft type, this distance is demonstrated to the authorities by a highly skilled factory pilot well prepared for his task, who knows before hand which abnormal condition he will encounter and when this will happen.

For the line pilot the circumstances are different when engine thrust is lost before or at V1, because does not know if and when a failure will occur. Furthermore the line pilot may operate from slippery runways with a braking coefficient which is less than the one used for the ASD demonstrations.

Not-with-standing the use of a time delay before taking the decision to reject and the fact that reverse thrust is excluded for ASD demonstrations, it may be assumed that a rejection of a take-off on a marginal runway, from high speed close to V1, in particular when the runway is wet, can be extremely hazardous.

Therefore, above a speed specified in the relevant AOM, the use of the command word "STOP" or the advisory word "FAILURE" by any crew member, or rejection of take-off, should be confined to circumstances where a very positive loss of thrust occurs or where aircraft condition clearly renders it unflyable.

The decision to reject the take-off lies with the PiC except when the first officer is flying and he observes a malfunction which renders the aircraft unflyable such as flight control malfunction.

The PiC, however, remains responsible to the best of his ability.

AIRCRAFT OPERATION MANUAL (AOM) 抜粋

3.3 FLIGHT TECHNIQUES

3.3.1 General

- The PF calls and the PNF responds with "CHECKED"
 - In case of a mode change that is not the immediate result of a selection.
 - .. If the mode change goes unnoticed by the PF, the PNF calls and the PF responds with "CHECKED".

Summary of COMMANDS and CALLS

COMMANDS	CALLS
SET CWS 1/2 1)	CWS 1/2 SET 1)
SET AUTOTHROTTLE(S/ 1/ 2) ON	N ₁ or SPEED or CLAMP
SET N ₁	N ₁

1) The number may be omitted when switching an already engaged autopilot.

No commands are described to select autothrottle(s) or autopilot(s) OFF, because this is normally done by the PF with the disengage buttons. Otherwise the terminology is as prescribed per procedure.
Announce any disconnection by calling "AUTOPILOT OFF" or "AUTOTHROTTLE OFF" and SCD extinguishing the respective warning light(s).

3.3 FLIGHT TECHNIQUES

3.3.3 Take-off And Climb

04.6 AUTODISCONNECT DURING TAKE-OFF

In case of an autodisconnect during take-off do not re-engage, but maintain the existing autopilot/autothrottle configuration until the AFTER TAKE-OFF checklist has been completed.

The Flight Mode of Operation might remain, or change back to, MANUAL.

05 REJECTED TAKE-OFF (RTO)

The rejection of a take-off at high speed can be extremely hazardous, especially when runway length and/or condition is critical. Therefore the take-off should only be rejected in case the continuation is considered less safe. The decision to reject may only be made before V_1 .

The PF should reject the take-off in case of:

- Fire warning sound.
- Engine failure.
- Control problems affecting safe aircraft handling.

The rejection of the take-off for other failures than the above mentioned cases, should in principle be limited to speeds below 100 kts.

The rejection of the take-off is initiated by the call "STOP". In the above mentioned cases the PF may call "STOP". In all other cases the decision to initiate the rejection of a take-off is restricted to the captain.

It is very important that the brake pedals are pushed to maximum deflection AND ARE HELD IN THAT POSITION UNTIL THE AIRCRAFT HAS COME TO A COMPLETE STOP.

NOTE: Autobrakes are NOT certified as primary means to stop the aircraft. If installed, they are to be considered as a backup in case the PF fails to produce the required brake force.

Should the F/O or the F/E consider a rejection advisable, (s)he must announce the reason thereof (e.g. "ENGINE FAILURE"). In order not to distract the attention of the cockpit crew during the rejection of the take-off, no further information about the reason to reject will be given until the aircraft has come to a full stop.

CREW CO-ORDINATION

PF	PNF	F/E
Move throttles rapidly to idle AND SIMULTANEOUSLY Apply maximum brake pedal deflection IMMEDIATELY FOLLOWED BY Reverse thrust Hold control column slightly forward of neutral	Check spoilers. If not extended: call "NO SPOILERS" Hold control column slightly forward of neutral	Check spoilers. If not extended: extend spoilers. "GREEN LIGHTS" 1)

1): In case of reverser failure the F/E calls "REVERSE NUMBER ... (AND ...) ONLY".

After the aircraft has come to a standstill:

- State nature of the failure.

CAPTAIN	FIRST OFFICER	F/E
Command: "TAKE ACTION". Make a PA announcement: "CABIN CREW AND PASSENGERS, REMAIN SEATED" Evaluate situation and decide on follow-up actions.	Inform ATC. Request assistance (as considered necessary).	Consult the Brake Energy Chart, refer to AOM 2.14.3 and advise pilots to use parking brakes accordingly.

Depending on circumstances:

- Start APU
- Consider to vacate the runway
- Inform ATC accordingly, request technical assistance, stairs and chocks
- Inform purser and passengers
- Shut down engines
- Switch off anti-collision lights and hi intensity lights
- Perform the Normal Checklist
- Consider towing the aircraft to a parking position and/or disembarking passengers via stairs.